VARIETAL INFLUENCE ON CONTROL OF VOLUNTEER CORN WITH DICLOFOP

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ABSTRACT

Corn (Zea *mays* L.) can be a serious weed in soybean [*Glycine max* (L.) Merr.] fields. A new herbicide, diclofop, has selectively controlled corn in soybeans when applied as a spray over the top of both soybeans and corn. Corn inbreds have shown differing degrees of susceptibility to diclofop. This report gives the response to diclofop by F_2 generation plants (simulated volunteer corn) from 240 Corn Belt hybrids. F_2 generation plants showed differing degrees of susceptibility to diclofop, suggesting that volunteer corn from some hybrids might be unsatisfactorily controlled especially in cases where diclofop was not applied at the proper time or at the proper rate or where environmental factors were unfavorable for herbicidal activity.

Keywords: Herbicides, weed control, maize, Zea *mays*, soybeans, *Glycine max*, hybrid corn.

CONTENTS

VARIETAL INFLUENCE ON CONTROL OF VOLUNTEER CORN WITH DICLOFOP[1]

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INTRODUCTION

Soybeans following corn in a rotation are often infested with volunteer corn. Volunteer corn may reduce yields of soybeans by competition, may interfere with soybean harvest, and may increase dockage in soybean seed. The amount of corn left in the field to infest a soybean crop is influenced by disease, insect, and weather conditions during the year of corn production. Severity of the volunteer corn problem therefore varies greatly from year to year. It can also be a problem in crops other than soybeans.

Mechanical cultivation controls volunteer corn between soybean rows, and hoeing or hand-pulling is used for control in the soybean rows. Several herbicides of the dinitroanaline class inhibit the growth of corn when used for weed control in soybeans, but the degree of corn control with these herbicides is far from satisfactory. The non-selective herbicide, glyphosate[3] [*N*-(phosphonomethyl) glycine], has shown promise for controlling volunteer corn that is overtopping the soybeans, when applied with devices that permit herbicide contact with the corn and little or no contact with the soybeans. But, currently, no commercially available herbicide is available that can selectively control corn in soybeans when applied directly to both the corn and soybeans.

We have been studying an herbicide that has controlled corn, and other annual grass weeds, selectively in soybeans when sprayed over the top of both corn and soybeans (*1*). This herbicide, 2-[4-(2,4-dichlorophenoxy) phenoxy] propanoic acid, has the common name, diclofop[3], and has previously been studied under the code number, HOE 23408. In previous studies (*1*), we found that some corn inbreds were more tolerant than others to diclofop. Our subsequent studies (2) involving resistant and susceptible corn inbreds suggested that inheritance of tolerance to diclofop was primarily an additive effect controlled by genes at several loci. The practical implication of this work was that the control of volunteer corn in soybeans by foliar applications of diclofop would depend in part on the parentage of corn hybrids grown the previous year.

Hybrid corn is produced by crossing inbred corn lines. Volunteer corn in soybean fields is the F_2 generation of the hybrid originally planted. Predicting whether volunteer corn from a certain hybrid was resistant or susceptible to diclofop might be possible from knowledge of the resistance or susceptibility of the inbreds used in producing the hybrid. However, this is not practical because the identity of the inbreds used in making commercial hybrids is usually not public knowledge. Therefore, we evaluated the response to diclofop in F_2 generation plants of a relatively large sampling of Corn Belt hybrids to obtain some idea of the range of response and the likelihood of satisfactory control of volunteer corn from numerous hybrids.

The primary purpose of this report is to record our findings on the response of F_2 generation plants of 240 hybrids to diclofop. This information may be of practical importance if and when diclofop becomes available to soybean growers; it is currently in the experimental use permit stage. A secondary purpose is to record the response of the

[1] Cooperative investigations of Agricultural Reseorch, Science and Educotion Administrotion, U.S. Department of Agriculture, and the University of Minnesoto Agriculturol Experiment Stotion. Poper No. 1715, Miscellaneous Journol Series, Minnesoto Agriculturol Experiment Stotion, St. Paul, Minn. 55108.

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[3] Trode names for the herbicides mentioned in this report by common nomes ore alochlor—trode nome, Lasso; diclofop—trode nome, Hoelon; ond glyphosote—trode nome, Roundup. Trode nomes ore included here only for identificotion. Mention of o trademork or proprietory product does not constitute o guorontee or warronty of the product by the U.S. Deportment of Agriculture, or the University of Minnesoto, and does not imply its opprovol to the exclusion of other products thot moy olso be suitoble.

F_2 generation of these hybrids to methyl 2-[4-(4-trifluoromethylphenoxy) phenoxy] propanoate (HOE 29152). This herbicide is similar to diclofop, but it is no longer being actively developed.

MATERIALS AND METHODS

Seed samples of corn hybrids were obtained from various commercial hybrid seed producers. To these were added additional seed samples of open-pedigree hybrids involving several proprietary inbred lines from Illinois Foundation Seeds, Inc., and several public inbred lines from state experiment stations. These hybrids were planted at St. Paul, Minn., in 1976. F_2 seeds were produced by making 10 plant-to-plant crosses within each hybrid. Approximately equal numbers of seeds were taken from each of the 10 ears and bulked to form a composite of F_2 seed for each hybrid. F_2 seeds of 240 of these hybrids were planted May 11 and 12, 1977, at Rosemount, Minn., in three-row plots arranged in a randomized complete block experiment having three replications. Rows were 11 feet long and 40 inches apart with 100 seeds per row. Several rows of soybeans ('Hodgson') were planted at the sides of the experiment for reference. A preemergence application of 2-chloro-2',6'-diethyl-*N*-(methoxymethyl) acetanilide [alachlor[3]] at 2 lb/A, and hand-weeding as needed, were used to control weeds in all plots. On June 6, 1977, soybeans were in the second trifoliolate stage and corn was in the 6- to 7-leaf stage (11 to 20 inches unextended height). On this date, one row in each of the three-row plots was sprayed with diclofop at 1 lb/A, one row was sprayed with HOE 29152 at 3/8 lb/A, and one row was left untreated. Spray volume was 20 gal/A and pressure was 30 psi. A single nozzle tip set to be 18 inches above the top of the reference soybeans was centered over the corn rows and shielded to minimize drift away from the treated rows.

Three weeks after treatment, treated plants were rated (0 percent = no effect, 100 percent = dead) in comparison to untreated plants of the same parentage. An overall percent control value was determined for each treated row as well as the percentage of plants having 70 percent, or less, control. Plants having 70 percent control showed signs of recovering from treatment and were about as tall as the reference soybeans. Hence, plants having 70 percent, or less, control were considered to be unsatisfactorily controlled.

In 1978, the experiment was repeated using only 10 susceptible and 10 resistant entries from the 1977 experiment. Procedures were the same as in 1977 except as follows. Corn and reference soybeans were planted May 15 at 56 corn seeds per row. Alachlor was applied at 3 lb/A as a preplanting soil incorporated treatment for weed control in all plots. On June 13, diclofop was applied at ½ or 1 lb/A. At this time, reference soybeans were in the first trifoliolate stage and corn was in the 4- to 7-leaf stage. Corn plants ranged in height from 5 to 12 inches (unextended) within the same F_2 generation hybrid, with little difference in overall height among the 20 F_2 generation hybrids in this study.

Raw data were used in all analyses of variance. Negative tests for non-additivity and lack of response to square-root transformations of the raw data (*3*) indicated the assumptions involved in analysis of variance using the raw data were appropriate.

RESULTS AND DISCUSSION

The results obtained using diclofop for volunteer corn control in soybeans would depend on many factors, such as stage of growth of the corn, rate of application, and environmental conditions, as well as the parentage of the corn. This report is concerned with the effect of hybrid parentage.

The stage of growth of the corn in the 1977 study was near that which might be encountered in grower use, although our previous studies (*1*) suggest that spraying at an earlier stage, as was done in the 1978 study, might be more desirable. The 1 lb/A rate of diclofop was chosen because we expect this to be near the labeled rate, if and when diclofop is fully registered for use.

F-tests of treatment mean squares from the analyses of variance indicated that statistically significant ($P < 0.01$) differences existed among F_2 generation hybrids for overall percent control and for percent of plants unsatisfactorily controlled by the herbicide treatments in both the 1977 and 1978 studies.

Table 1 shows the hybrids included in the 1977

Table 1.—*Control of F_2 generation plants of various corn hybrids with diclofop and HOE 29152. Rosemont, Minn. 1977*

Hybrid[1]	Diclofop 1 lb/A				HOE 29152 3/8 lb/A			
	Overall control[2]		Plants unsatisfactorily controlled[3]		Overall control[2]		Plants unsatisfactorily controlled[3]	
	(%)	(Rank)	(%)	(Rank)	(%)	(Rank)	(%)	(Rank)
W153R X IA72:1259	62	1	68	1	87	1	17	1
JACQUES JX25	69	2	58	2	98	9	3	11
DEKALB XL21A	72	3	48	3	99	10	0	14
PIONEER 3709	75	4	42	4	98	9	0	14
PRIDE 110	77	5	32	10	97	8	4	10
SOKOTA SS-49	77	5	41	5	98	9	2	12
PIONEER 3710	78	6	38	6	98	9	3	11
FR805W X FR802W	78	6	37	7	98	9	3	11
(FR37 X FR4C)FRM017	79	7	36	8	95	6	3	11
H93 X M017	79	7	27	14	93	4	6	8
BLANEY B220	80	8	32	10	93	4	9	5
SOKOTA SS-41	80	8	30	12	98	9	3	11
FR632 X H95	80	8	34	9	98	9	2	12
PAG SX111	81	9	17	23	97	8	2	12
ACCO DC109	82	10	28	13	98	9	3	11
DEKALB XL310	82	10	16	24	98	9	2	12
JACQUES JX30	82	10	31	11	94	5	8	6
PRIDE R121	82	10	23	18	97	8	3	11
TROJAN TX113A	83	11	21	20	96	7	2	12
FR632 X FR153R	83	11	25	16	94	5	8	6
CARGILL 404	84	12	21	20	98	9	2	12
CARGILL 890	84	12	24	17	96	7	3	11
DEKALB 007	84	12	23	18	96	7	4	10
PAG SX454	84	12	26	15	91	2	9	5
MINHYBRID 5201	84	12	16	24	99	10	2	12
BLANEY B605WX	85	13	22	19	98	9	2	12
PIONEER 3382	85	13	23	18	98	9	2	12
PIONEER 3517	85	13	20	21	96	7	2	12
FR632 X H99	85	13	17	23	98	9	4	10
(FR37 X FR4A)FRM017	85	13	13	27	91	2	10	4
FRK55 X FRK64	85	13	18	22	98	9	3	11
PAG 534	86	14	18	22	97	8	3	11
PIONEER 3715	86	14	31	11	99	10	1	13
PRIDE R103	86	14	20	21	99	10	1	13
FR4AHT X FR632	86	14	15	25	98	9	3	11
(H99 X FRVA26HT)FR632	86	14	14	26	97	8	4	10
MINHYBRID 8301	86	14	14	26	99	10	2	12
ACCO UC1131	87	15	20	21	97	8	4	10
BLANEY B100	87	15	18	22	98	9	3	11
NK PX529	87	15	15	25	99	10	0	14
PAYCO 3X443	87	15	21	20	98	9	2	12
DEKALB XL12	88	16	15	25	92	3	11	3
FUNK G4141	88	16	11	29	94	5	6	8
JACQUES JX733	88	16	15	25	98	9	1	13
PAYCO 3X690	88	16	25	16	96	7	6	8
PIONEER 3529	88	16	12	28	96	7	6	8
PRIDE 1106	88	16	14	26	99	10	2	12
SOKOTA TS-49	88	16	14	26	98	9	2	12
TROJAN TXS82	88	16	12	28	97	8	4	10
B76 X M017	88	16	8	32	97	8	2	12
DEKALB XL35	89	17	15	25	99	10	2	12
NK PX606	89	17	8	32	93	4	8	6
PAYCO 369	89	17	17	23	99	10	2	12
PAYCO 3X573	89	17	18	22	97	8	6	8
PIONEER 3388	89	17	12	28	95	6	4	10
SOKOTA SK-49	89	17	10	30	98	9	3	11
SOKOTA TS-46	89	17	11	29	98	9	4	10
FRM017 X VA26HT	89	17	6	34	99	10	1	13
ACCO EXP51128	90	18	13	27	99	10	1	13
BLANEY 7606	90	18	6	34	99	10	1	13
DEKALB XL42	90	18	4	36	96	7	3	11
FUNK G5191	90	18	13	27	99	10	1	13

See footnotes at end of table.

Table 1.—*Control of F_2 generation plants of various corn hybrids with diclofop and HOE 29152. Rosemount, Minn. 1977*—Continued

Hybrid[1]	Diclofop 1 lb/A				HOE 29152 3/8 lb/A			
	Overall control[2]		Plants unsatisfactorily controlled[3]		Overoll control[2]		Plants unsatisfactorily controlled[3]	
	(%)	(Rank)	(%)	(Ronk)	(%)	(Rank)	(%)	(Ronk)
JACQUES JX134	90	18	7	33	97	8	4	10
PAG SX121	90	18	11	29	95	6	2	12
PRIDE R501	90	18	10	30	98	9	2	12
ACCO U322	91	19	10	30	96	7	6	8
PAG SX424	91	19	8	32	99	10	2	12
PAYCO 470	91	19	14	26	99	10	2	12
PRIDE 5565	91	19	4	36	99	10	2	12
TROJAN TX100	91	19	6	34	98	9	2	12
FUNK 27810-5220	92	20	9	31	98	9	3	11
FUNK G5048	92	20	6	34	99	10	2	12
PIONEER 3965	92	20	10	30	97	8	3	11
TROJAN TX92	92	20	9	31	98	9	1	13
KY228 X KY226	92	20	9	31	95	6	8	6
MINHYBRID 5301	92	20	14	26	97	8	3	11
ACCO DC141	93	21	8	32	98	9	2	12
ACCO EXP51124	93	21	7	33	97	8	3	11
ACCO U305	93	21	9	31	95	6	3	11
ACCO UC1151	93	21	9	31	98	9	2	12
DEKALB XL43	93	21	7	33	97	8	4	10
FUNK G4321A	93	21	7	33	98	9	2	12
JACQUES JX62	93	21	10	30	95	6	6	8
JACQUES JX823	93	21	4	36	98	9	4	10
NK PX32	93	21	1	39	99	10	1	13
NK PX46	93	21	5	35	98	9	3	11
NK PX65	93	21	8	32	96	7	5	9
NK PX420	93	21	9	31	99	10	0	14
PAG 340	93	21	6	34	95	6	7	7
PAYCO SX680	93	21	6	34	98	9	3	11
PRIDE R450	93	21	6	34	100	11	1	13
SOKOTA MS-35	93	21	5	35	99	10	1	13
SOKOTA SK-54	93	21	9	31	94	5	7	7
TROJAN TX90	93	21	8	32	98	9	2	12
TROJAN TXS99	93	21	6	34	96	7	5	9
FRM017 X A634HT	93	21	6	34	96	7	4	10
M01W X FR805W	93	21	11	29	92	3	8	6
A661 X W182B	93	21	7	33	99	10	1	13
A662 X W64A	93	21	8	32	99	10	2	12
ACCO DC147	94	22	4	36	99	10	1	13
ACCO UC2901	94	22	10	30	98	9	3	11
BLANEY B302	94	22	5	35	98	9	2	12
DEKALB XL54	94	22	9	31	99	10	1	13
MINHYBRID 806	94	22	12	28	99	10	2	12
DEKALB XL315A	94	22	7	33	99	10	1	13
PAG SX397	94	22	4	36	98	9	2	12
PAYCO SX580	94	22	8	32	93	4	8	6
PAYCO SX688	94	22	6	34	98	9	2	12
PIONEER 3716	94	22	3	37	98	9	2	12
PRIDE 2206	94	22	3	37	99	10	1	13
PRIDE R144	94	22	7	33	97	8	4	10
PRIDE R221	94	22	5	35	94	5	5	9
FRM017 X H100	94	22	10	30	97	8	6	8
CARGILL 830	95	23	4	36	99	10	1	13
CARGILL 920	95	23	6	34	99	10	1	13
JACQUES JX52	95	23	5	35	98	9	2	12
JACQUES JX177	95	23	1	39	98	9	2	12
NK PX20	95	23	5	35	99	10	0	14
NK PX48	95	23	3	37	98	9	1	13
NK PX50A	95	23	4	36	98	9	2	12
PAG 220	95	23	1	39	99	10	0	14
PAYCO SX465	95	23	6	34	97	8	1	13
PRIDE R545	95	23	5	35	99	10	1	13
SOKOTA SS-59-A	95	23	3	37	97	8	3	11

See footnotes at end of table.

Table 1.—*Control of F_2 generation plants of various corn hybrids with diclofop and HOE 29152. Rosemount, Minn. 1977*—Continued

Hybrid[1]	Diclofop 1 lb/A				HOE 29152 3/8 lb/A			
	Overall control[2]		Plants unsatisfactorily controlled[3]		Overall control[2]		Plants unsatisfactorily controlled[3]	
	(%)	(Rank)	(%)	(Rank)	(%)	(Rank)	(%)	(Rank)
SOKOTA TS-77	95	23	4	36	95	6	7	7
TROJAN TX99A	95	23	1	39	100	11	0	14
TROJAN TXS94	95	23	4	36	97	8	5	9
FRM017 X N7AHT	95	23	3	37	95	6	7	7
FRM017 X FR14A	95	23	5	35	97	8	4	10
FRM017 X FRN28	95	23	3	37	95	6	7	7
FR64A X FR632	95	23	3	37	99	10	1	13
A661 X W64A	95	23	5	35	100	11	0	14
ACCO U334	96	24	2	38	96	7	3	11
ACCO UC1901	96	24	5	35	98	9	1	13
ACCO UC3301	96	24	3	37	97	8	4	10
BLANEY 8303A	96	24	4	36	98	9	3	11
BLANEY B401	96	24	3	37	97	8	3	11
FUNK G4040	96	24	1	39	100	11	1	13
FUNK G4180-3900	96	24	5	35	99	10	1	13
FUNK G4272	96	24	2	38	99	10	1	13
JACQUES JX92	96	24	3	37	98	9	3	11
JACQUES JX1033A	96	24	1	39	97	8	5	9
PAYCO 562	96	24	6	34	98	9	5	9
PRIDE 3315	96	24	4	36	97	8	4	10
PRIDE 5525	96	24	3	37	96	7	5	9
SOKOTA TS-67	96	24	2	38	97	8	4	10
TROJAN TX103	96	24	4	36	99	10	1	13
TROJAN TXS108A	96	24	3	37	94	5	6	8
FR632 X OH545	96	24	1	39	98	9	2	12
MINN. EXP. M309	96	24	8	32	98	9	2	12
W153R X IA72:1263	96	24	8	32	96	7	8	6
ACCO U310	97	25	3	37	98	9	3	11
ACCO UC1129	97	25	1	39	99	10	2	12
CARGILL 449	97	25	2	38	98	9	1	13
CARGILL 863	97	25	1	39	98	9	1	13
CARGILL 949	97	25	3	37	97	8	4	10
JACQUES JX20	97	25	3	37	100	11	1	13
JACQUES JX122A	97	25	2	38	98	9	3	11
PAG 145	97	25	2	38	97	8	5	9
PAG SX53	97	25	3	37	98	9	3	11
PAYCO SX555	97	25	3	37	98	9	3	11
PRIDE A40	97	25	5	35	97	8	5	9
SOKOTA SK-50	97	25	2	38	95	6	5	9
SOKOTA TS-82	97	25	2	38	96	7	3	11
FRM017 X FR15A	97	25	3	37	92	3	12	2
FRM017 X B79	97	25	2	38	94	5	7	7
B73 X VA26	97	25	1	39	97	8	4	10
(FR43 X FR619)FR632	97	25	2	38	99	10	2	12
MINHY8RID 6301	97	25	3	37	97	8	5	9
A662 X W182B	97	25	3	37	100	11	1	13
BLANEY 8AA	98	26	1	39	99	10	1	13
BLANEY B601WX	98	26	2	38	99	10	1	13
BLANEY 8606	98	26	1	39	99	10	1	13
CARGILL 425	98	26	2	38	100	11	1	13
CARGILL 875	98	26	3	37	99	10	1	13
DEKALB XL303	98	26	3	37	100	11	1	13
FUNK 27809	98	26	1	39	99	10	2	12
FUNK G4082	98	26	0	40	100	11	0	14
FUNK G4252	98	26	3	37	99	10	2	12
FUNK G4288	98	26	2	38	97	8	5	9
FUNK G4444	98	26	2	38	98	9	2	12
JACQUES JX124A	98	26	3	37	98	9	3	11
JACQUES JX174	98	26	4	36	99	10	2	12
NK PX443	98	26	1	39	100	11	1	13
NK PX466	98	26	2	38	100	11	0	14
NK PX585	98	26	1	39	99	10	3	11

See footnotes at end of table.

Table 1.—*Control of F_2 generation plants of various corn hybrids with diclofop and HOE 29152. Rosemount, Minn. 1977*—Continued

Hybrid[1]	Diclofop 1 lb/A				HOE 29152 3/8 lb/A			
	Overall control[2]		Plants unsatisfactorily controlled[3]		Overall control[2]		Plants unsatisfactorily controlled[3]	
	(%)	(Rank)	(%)	(Rank)	(%)	(Rank)	(%)	(Rank)
PAG SX67	98	26	3	37	99	10	2	12
PAG SX177	98	26	2	38	99	10	0	14
PAYCO 3X344	98	26	0	40	98	9	3	11
PIONEER 3780	98	26	4	36	99	10	3	11
PIONEER 3785	98	26	1	39	97	8	3	11
PIONEER 3955	98	26	1	39	100	11	0	14
PIONEER 3978	98	26	1	39	99	10	2	12
PRIDE 4404	98	26	1	39	99	10	2	12
SOKOTA SK-36	98	26	2	38	98	9	1	13
SOKOTA SK-79	98	26	1	39	95	6	5	9
TROJAN TXS102	98	26	1	39	99	10	0	14
TROJAN TXS115A	98	26	3	37	99	10	1	13
FRM017 X H60	98	26	3	37	97	8	5	9
B73 X FRM017	98	26	1	39	98	9	4	10
FR632 X H98	98	26	2	38	100	11	0	14
MINHYBRID 8201	98	26	3	37	99	10	2	12
DEKALB XL 311	98	26	2	38	99	10	2	12
MINHY8RID 7301	98	26	3	37	99	10	1	13
MINHY8RID 4201	98	26	1	39	99	10	1	13
BLANEY B33A	99	27	2	38	100	11	0	14
BLANEY B443	99	27	2	38	99	10	1	13
BLANEY B501A	99	27	0	40	98	9	2	12
CARGILL 434	99	27	1	39	99	10	0	14
CARGILL 846	99	27	1	39	99	10	1	13
CARGILL 848	99	27	0	40	98	9	4	10
DEKALB XL14A	99	27	1	39	99	10	1	13
DEKAL8 XL39	99	27	1	39	100	11	0	14
DEKALB XL321	99	27	1	39	99	10	1	13
FUNK G4195	99	27	1	39	99	10	1	13
FUNK G4449	99	27	1	39	97	8	3	11
NK PX15	99	27	0	40	99	10	1	13
NK PX418	99	27	0	40	99	10	2	12
PAG SX69	99	27	0	40	98	9	2	12
PIONEER 3932A	99	27	1	39	99	10	1	13
PIONEER 3968	99	27	1	39	99	10	0	14
SOKOTA SS-51	99	27	0	40	98	9	4	10
TROJAN TX108	99	27	1	39	98	9	1	13
TROJAN TXS105A	99	27	1	39	98	9	1	13
TROJAN TXS114	99	27	0	40	99	10	1	13
FR632 X H60	99	27	1	39	100	11	0	14
B73 X W64AHT	99	27	1	39	99	10	2	12
B73 X H98	99	27	1	39	98	9	1	13
FR619 X FR632	99	27	1	39	98	9	3	11
MINHYBRID 6304	99	27	2	38	98	9	3	11
MINHY8RID 4301	99	27	1	39	99	10	2	12
A664 X W182B	99	27	0	40	100	11	0	14
A665 X W182B	99	27	0	40	98	9	2	12
A666 X A638	99	27	2	38	99	10	2	12
8LANEY B503	100	28	0	40	99	10	1	13
CARGILL 825	100	28	0	40	100	11	1	13
DEKALB XL16	100	28	1	39	99	10	1	13
NK PX26	100	28	1	39	99	10	1	13
PAG 314	100	28	0	40	99	10	1	13
A664 X A665	100	28	0	40	99	10	2	12
Mean	93		8		98		3	
Least significant difference (0.05)	6		11		4		5	

[1] Praprietary hybrids are identified by brand and variety.

[2] Overall cantral (0 percent = no effect, 100 percent = dead) for all plants in the treated raws.

[3] Plants unsatisfactorily cantrolled; that is, thase having 70 percent, ar less, cantral.

experiment arranged in increasing order of susceptibility of F_2 generation plants based on the overall percent control from diclofop at 1 lb/A. Percent values in table 1 have been recorded to the nearest whole; this accounts for the instances seen in the table where control is 100 percent, but 1 percent of the plants was unsatisfactorily controlled. The range was from 60 percent control for W153R × IA72:1259 to 100 percent control for several hybrids. The percentage of plants unsatisfactorily controlled range from 68 percent for WI53R × IA72:1259 to 0 percent for several hybrids.

HOE 29152 was included in this experiment because in preliminary greenhouse studies we found it to be more active than diclofop. This greater activity of HOE 29152 is borne out in table 1, where percent control averaged across all hybrids is higher for HOE 29152, even though its rate is much less than that of diclofop. As mentioned previously, HOE 29152 is no longer being developed by the manufacturer.

Table 2 shows the results from the 1978 experiment, which included two rates of diclofop and 10 resistant and 10 susceptible entries selected from the 1977 experiment. In 1978, overall control was greater than in 1977, probably because corn was smaller at time of treatment. However, the entries we selected as resistant or susceptible in 1977 would be classified the same in our 1978 study, except perhaps for Sokota brand, variety SS-49, which appeared more susceptible than we expected from our 1977 study.

The effect of pedigree on the degree of control is most obvious at the lower rate but is also apparent at the higher rate. Figure 1 shows the appearance of F_2 plants from a resistant and susceptible hybrid 6 weeks after treatment in the 1978 experiment. We interpret the 1978 results as supporting the validity of our 1977 response ratings.

Our studies suggest that although volunteer corn is generally quite susceptible to diclofop, the parentage of the volunteer corn may be a factor in the results obtained with this herbicide. The importance of parentage may be apparent in cases where diclofop is not applied at the proper time

Table 2.—*Control of F_2 plants of 20 selected corn hybrids with diclofop. Rosemount, Minn. 1978*

Hybrid[1]	Diclofop ½ lb/A				Diclofop 1 lb/A			
	Overall control[2]		Plants unsatisfactorily controlled[3]		Overall control[2]		Plants unsatisfactorily controlled[3]	
	(%)	(Rank)	(%)	(Rank)	(%)	(Rank)	(%)	(Rank)
Resistant in 1977 Study:								
W153R X IA72: 1259	80	1	39	1	94	2	16	1
PIONEER 3709	82	2	22	3	93	1	13	2
DEKALB XL21A	86	3	19	5	95	3	9	3
H93 X MO17	87	4	21	4	96	4	8	4
JACQUES JX25	87	4	23	2	95	3	5	5
PIONEER 3710	88	5	21	4	95	3	9	3
(FR37 X FR4C) FRMO17	89	6	15	7	95	3	4	6
PRIDE 110	89	6	19	5	95	3	9	3
FR805W X FR802W	91	7	17	6	96	4	9	3
SOKOTA SS-49	96	8	6	8	99	5	1	7
Susceptible in 1977 Study:								
CARGILL 848	97	9	5	9	99	5	0	8
SOKOTA SS-51	97	9	2	11	99	5	1	7
NK PX418	98	10	1	12	100	6	0	8
PAG SX69	98	10	3	10	100	6	0	8
BLANEY B503	99	11	0	12	100	6	0	8
BLANEY B501A	99	11	2	11	100	6	0	8
PAG 314	99	11	1	12	100	6	0	8
TROJAN TXS114	99	11	3	10	100	6	0	8
A664 X A665	100	12	0	13	100	6	0	8
CARGILL 825	100	12	0	13	100	6	0	8
Mean	93		11		98		4	
Least significant difference (0.05)	5		11		2		6	

[1] Proprietary hybrids are identified by brand and variety.

[2] Overall control (0 percent = no effect, 100 percent = dead) for all plants in the treated rows.

[3] Plants unsatisfactorily controlled; that is, those having 70 percent, or less, control.

FIGURE 1.—Response of F_2 generation corn plants to diclofop, Rosemount, Minn. 1978. Treatments applied June 13. Photographed 6 weeks after treatment. Back three rows (A) are Pioneer brand, voriety 3709 (resistant). Front three rows (B) are Blaney brand, variety B501A (susceptible). Treatments are left (L), diclofop 1/2 1b/A; center (C), untreated; right (R), diclofop 1 lb/A.

or the proper rate, or in cases where environmental factors are unfavorable for herbicidal activity.

Our ratings of the response of the F_2 generation of corn hybrids given in table 1 cannot be considered absolute. To obtain data that would be accurate across the entire Corn Belt under all possible environmental conditions would be impractical and probably impossible. However, the information in table 1 may be useful to those interested in controlling volunteer corn with diclofop. To our knowledge this kind of information currently does not exist anywhere else.

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